

**Notice of Allowability**

Application No.

10/672,183

Examiner

Qing Chen

Applicant(s)

DE JONG, EDUARD K.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on August 29, 2007.
2. ☒ The allowed claim(s) is/are 1,2,4-13,15-24,26-35 and 37-48, renumbered as 1-44.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date 20070904
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

### **DETAILED ACTION**

1. This Office action is in response to the amendment filed on August 29, 2007.
2. **Claims 1, 2, 4-13, 15-24, 26-35, and 37-48** are pending.
3. **Claims 1, 8, 12, 19, 23, 30, 34, 41, and 45-48** have been amended.
4. **Claims 3, 14, 25, and 36** have been cancelled.
5. **Claims 1, 2, 4-13, 15-24, 26-35, and 37-48** are allowed, renumbered as 1-44.
6. The objections to the drawings are withdrawn in view of Applicant's amendments to the drawings and the specification.
7. The objections to Claims 1-7, 12-18, 23-29, 34-40, 46, and 47 are withdrawn in view of Applicant's amendments to the claims.

### **EXAMINER'S AMENDMENT**

8. An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to Applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this Examiner's amendment was given in a telephone interview with Forrest Gunnison (Reg. No. 32,899) on October 22, 2007.

The application has been amended as follows:

#### **In the Claims:**

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Please cancel Claims 3, 14, 25, and 36 and amend Claims 1, 8, 12, 19, 23, 30, 34, 41, 45, and 48 as follows:

1. (Currently Amended) A method for executing an obfuscated application program, the method comprising:

receiving an obfuscated application program, said obfuscated application program comprising at least one instruction opcode value encoded using one of a plurality of instruction set opcode value encoding schemes;

receiving an application program instruction corresponding to a current instruction counter value;

selecting an instruction dispatch table based at least on said current instruction counter value, wherein said selecting comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and selecting the instruction dispatch table associated with the result of said modulo-n arithmetic operation; and

executing said application program instruction using said selected instruction dispatch table to obtain a reference to an instruction implementation method corresponding to an opcode value of said application program instruction.

3. (Cancelled)

8. (Currently Amended) A method for application program obfuscation, the method comprising:

- reading an application program comprising code;
- determining a plurality of dispatch tables associated with said application program;
- transforming said application program into application program code configured to utilize said plurality of dispatch tables during application program execution to determine the location of instruction implementation methods to be executed based at least on using a current instruction counter value to select a dispatch table in said plurality of dispatch tables for use with an application program instruction corresponding to said current instruction counter value, wherein to select said dispatch table in said plurality of dispatch tables comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and selecting the dispatch table associated with the result of said modulo-n arithmetic operation; and
- sending said application program code.

12. (Currently Amended) A program storage device readable by a machine, embodying a program of instructions executable by the machine to perform a method for executing an obfuscated application program, the method comprising:

- receiving an obfuscated application program, said obfuscated application program comprising at least one instruction opcode value encoded using one of a plurality of instruction set opcode value encoding schemes;

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receiving an application program instruction corresponding to a current instruction counter value;

selecting an instruction dispatch table based at least on said current instruction counter value, wherein said selecting comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and selecting the instruction dispatch table associated with the result of said modulo-n arithmetic operation; and

executing said application program instruction using said selected instruction dispatch table to obtain a reference to an instruction implementation method corresponding to an opcode value of said application program instruction.

14. (Cancelled)

19. (Currently Amended) A program storage device readable by a machine, embodying a program of instructions executable by the machine to perform a method for application program obfuscation, the method comprising:

reading an application program comprising code;

determining a plurality of dispatch tables associated with said application program;

transforming said application program into application program code configured to utilize said plurality of dispatch tables during application program execution to determine the location of instruction implementation methods to be executed based at least on using a current instruction counter value to select a dispatch table in said plurality of dispatch tables for use with

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an application program instruction corresponding to said current instruction counter value,  
wherein to select said dispatch table in said plurality of dispatch tables comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and selecting the dispatch table associated with the result of said modulo-n arithmetic operation; and  
sending said application program code.

23. (Currently Amended) An apparatus for executing an obfuscated application program, the apparatus comprising:

means for receiving an obfuscated application program, said obfuscated application program comprising at least one instruction opcode value encoded using one of a plurality of instruction set opcode value encoding schemes;

means for receiving an application program instruction corresponding to a current instruction counter value;

means for selecting an instruction dispatch table based at least on said current instruction counter value, wherein said means for selecting comprises means for performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and means for selecting the instruction dispatch table associated with the result of said modulo-n arithmetic operation; and

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means for executing said application program instruction using said selected instruction dispatch table to obtain a reference to an instruction implementation method corresponding to an opcode value of said application program instruction.

25. (Cancelled)

30. (Currently Amended) An apparatus for application program obfuscation, the apparatus comprising:

a processor; and

a memory, coupled to said processor, having stored therein computer readable instructions wherein executing said computer readable instructions on said processor provides:

means for reading an application program comprising code;

means for determining a plurality of dispatch tables associated with said application program;

means for transforming said application program into application program code configured to utilize said plurality of dispatch tables during application program execution to determine the location of instruction implementation methods to be executed based at least on using a current instruction counter value to select a dispatch table in said plurality of dispatch tables for use with an application program instruction corresponding to said current instruction counter value, wherein to select said dispatch table in said plurality of dispatch tables comprises means for performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch

tables, each of said dispatch tables associated with a unique number between 0 and n-1,  
and means for selecting the dispatch table associated with the result of said modulo-n  
arithmetic operation; and  
means for sending said application program code.

34. (Currently Amended) An apparatus for executing an obfuscated application program,  
the apparatus comprising a user device configured to:

receive an obfuscated application program, said obfuscated application program  
comprising at least one instruction opcode value encoded using one of a plurality of instruction  
set opcode value encoding schemes;

receive an application program instruction corresponding to a current instruction counter  
value;

select an instruction dispatch table based at least on said current instruction counter value,  
wherein to select said instruction dispatch table based at least on said current instruction counter  
value comprises perform modulo-n arithmetic operation on said current instruction counter  
value, where n is the number of dispatch tables, each of said dispatch tables associated with a  
unique number between 0 and n-1, and select the instruction dispatch table associated with the  
result of said modulo-n arithmetic operation; and

execute said application program instruction using said selected instruction dispatch table  
to obtain a reference to an instruction implementation method corresponding to an opcode value  
of said application program instruction.



36. (Cancelled)

41. (Currently Amended) An apparatus for application program obfuscation, the apparatus comprising an application program provider including a processor, and memory, coupled to said processor, having stored therein computer readable instructions wherein upon executing said computer readable instructions on said processor said application program provider is configured to:

read an application program comprising code;

determine a plurality of dispatch tables associated with said application program;

transform said application program into application program code configured to utilize said plurality of dispatch tables during application program execution to determine the location of instruction implementation methods to be executed based at least on use of a current instruction counter value to select a dispatch table in said plurality of dispatch tables for use with an application program instruction corresponding to said current instruction counter value, wherein to select said dispatch table in said plurality of dispatch tables comprises perform modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and select the dispatch table associated with the result of said modulo-n arithmetic operation;  
and

send said application program code.

45. (Currently Amended) A data processing system comprising:

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a processor; and

memory, coupled to said processor, for storing data for access by an application program being executed on said data processing system, said memory comprising:

a data structure stored in said memory, said data structure including information used by said application program to execute an obfuscated application program on said data processing system, said data structure comprising application program code configured to utilize a plurality of dispatch tables during execution of said obfuscated application program to determine a location of instruction implementation methods to be executed based at least on using a current instruction counter value to select a dispatch table in said plurality of dispatch tables for use with an application program instruction corresponding to said current instruction counter value, wherein to select said dispatch table in said plurality of dispatch tables comprises perform modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and select the dispatch table associated with the result of said modulo-n arithmetic operation.

48. (Currently Amended) A data processing system comprising:

a processor; and

memory, coupled to said processor, for storing data for access by an application program being executed on said data processing system, said memory comprising:

a data structure stored in said memory, said data structure including information used by said application program to execute an obfuscated application program, said data

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structure comprising a plurality of dispatch tables used during execution of said obfuscated application program to determine a location of instruction implementation methods to be executed based at least on using a current instruction counter value to select a dispatch table in said plurality of dispatch tables for use with an application program instruction corresponding to said current instruction counter value, wherein to select said dispatch table in said plurality of dispatch tables comprises perform modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and select the dispatch table associated with the result of said modulo-n arithmetic operation.

-- END OF AMENDMENT --

***Reasons for Allowance***

9. The following is an Examiner's statement of reasons for allowance:

The cited prior art taken alone or in combination fail to teach, in combination with the other claimed limitations, selecting an instruction dispatch table based at least on said current instruction counter value, wherein said selecting comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and selecting the instruction dispatch table associated with the result of said modulo-n arithmetic operation as recited in independent Claims 1, 12, 23, and 34; and further fail to teach select a dispatch table in

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said plurality of dispatch tables for use with an application program instruction corresponding to said current instruction counter value, wherein to select said dispatch table in said plurality of dispatch tables comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and selecting the dispatch table associated with the result of said modulo-n arithmetic operation as recited in independent Claims 8, 19, 30, 41, 45, and 48.

The closest cited prior art, the combination of US 6,334,189 (hereinafter Granger) and US 6,308,256 (hereinafter Folmsbee), teaches methods for impairing the ability of software pirates to remove or disable the executable copy protection code, or other security code, within a computer program. However, the combination of Granger and Folmsbee fails to teach selecting an instruction dispatch table based at least on said current instruction counter value, wherein said selecting comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-1, and selecting the instruction dispatch table associated with the result of said modulo-n arithmetic operation as recited in independent Claims 1, 12, 23, and 34; and further fail to teach select a dispatch table in said plurality of dispatch tables for use with an application program instruction corresponding to said current instruction counter value, wherein to select said dispatch table in said plurality of dispatch tables comprises performing modulo-n arithmetic operation on said current instruction counter value, where n is the number of dispatch tables, each of said dispatch tables associated with a unique number between 0 and n-

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1, and selecting the dispatch table associated with the result of said modulo-n arithmetic operation as recited in independent Claims 8, 19, 30, 41, 45, and 48.

Any comments considered necessary by Applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### *Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Qing Chen whose telephone number is 571-270-1071. The Examiner can normally be reached on Monday through Thursday from 7:30 AM to 4:00 PM. The Examiner can also be reached on alternate Fridays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Wei Zhen, can be reached on 571-272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QC / *QC*  
October 29, 2007



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SUPERVISORY PATENT EXAMINER